

# Rolling Deck to Repository (R2R):

## Collaborative Development of Linked Open Data



# R2R Program

































## Mission:

Provide uniform stewardship  
of routinely-collected  
environmental sensor data  
from the US academic  
research fleet

26 active service vessels

~400 primary sensor systems

~400 cruises/year

 <i>Alpha Helix (retired)</i>	 <i>Atlantic Explorer</i>	 <i>Atlantis</i>	 <i>Blue Heron</i>
 <i>Cape Hatteras (retired)</i>	 <i>Clifford A. Barnes</i>	 <i>Corwith Cramer</i>	 <i>Endeavor</i>
 <i>F.G. Walton Smith</i>	 <i>Healy</i>	 <i>Hugh R. Sharp</i>	 <i>Ka'imikai-o-Kanaloa</i>
 <i>Kilo Moana</i>	 <i>Knorr</i>	 <i>Laurence M. Gould</i>	 <i>Marcus G. Langseth</i>
 <i>Maurice Ewing (retired)</i>	 <i>Melville</i>	 <i>Moana Wave (retired)</i>	 <i>Nathaniel B. Palmer</i>
 <i>New Horizon</i>	 <i>Oceanus</i>	 <i>Pelican</i>	 <i>Point Sur</i>
 <i>Polar Sea</i>	 <i>Robert C. Seamans</i>	 <i>Robert Gordon Sproul</i>	 <i>Roger Revelle</i>
 <i>Savannah</i>	 <i>Sikuliaq</i>	 <i>Thomas G. Thompson</i>	 <i>Wecoma (retired)</i>



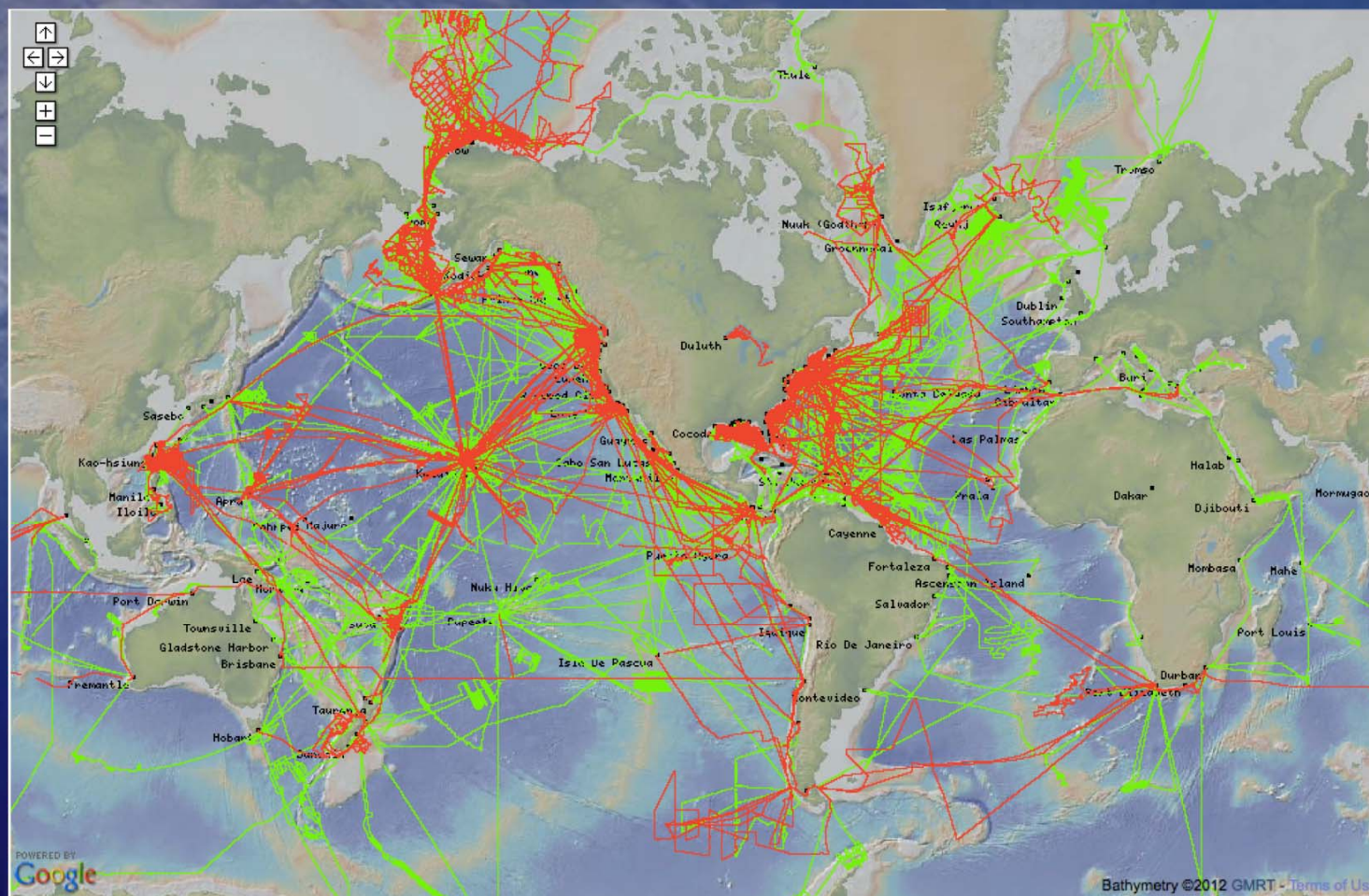
# Core Services

- Inventory cruises in a central catalog
- Upload sensor data from vessels; organize and document; deposit to long-term (NOAA) archives
- Assess quality of selected datasets
- Create quality-controlled products incl. shiptrack navigation, real-time met/ocean, geophysical profiles
- Provide tools for at-sea event logging



# R2R Catalog

As of Sep. 2013



— 1,772 New cruises since R2R launch in 2009

— 1,479 Additional / pre-2009 cruises received from vessel operators or other databases (LDEO, SIO, WHOI)

3,251 Total cruises

# Open Access

Goal: Provide R2R Catalog content that is

- Authoritative  
(complete and correct, with persistent/unique identifiers)
- Accessible  
(lightweight, standard interfaces)
- Interoperable  
(mapped to international/community vocabularies)



# Open Access *(cont.)*

Publish Catalog content in multiple formats, per user demand:

1. ISO 19115-2 XML Metadata records
2. OGC Web Services
3. W3C “Linked Data” + SPARQL endpoint

all using standard vocabularies

# Linked Open Data?



Publish content using World Wide Web Consortium (W3C) standards and community best practices:

- Each resource (Cruise, Vessel, Instrument, Dataset, File, Sample, Person, Place, etc) has a unique identifier (URI)
- Each URI returns content via HTTP in Resource Description Framework (RDF)
- Resources can be searched using RDF Query Language (SPARQL)
- Resources contain links (URIs) to *additional/related content* in other systems
- Content is published under an open license eg. CC 3.0





# R2R LOD Implementation



Deployed D2R Server (<http://d2rq.org/>) open-source package that maps existing SQL database to RDF on the fly.

Provides

- (backend) SPARQL query endpoint for machines
- (frontend) Pubby browser for humans

So far, performance is good for ~tens of thousands of triples.

<http://linked.rvdata.us/>



# R2R LOD Implementation (cont.)

*Top-level browse over all available resources in the Catalog*

Start Page | Rolling Deck to Repository (R2R) Linked Data

**Rolling Deck to Repository (R2R) Linked Data**  
Running at <http://linked.rvdata.us/>

Home | [Award Cruise Device](#) | [Event](#) | [Fileset](#) | [Format](#) | [Holding](#) | [Model](#) | [Organization](#) | [Participant](#) | [Person](#) | [Port](#) | [Product](#) | [Report](#) | [Repository](#) | [Track](#) | [Vessel](#)

This is a database published with:

1. Any old web browser
2. Semantic Web browser
3. SPARQL clients.

**1. HTML View**  
You can use the navigation link

**2. RDF View**  
You can also explore this data  
To start browsing, open this endpoint  
<http://linked.rvdata.us/all>

**3. SPARQL Endpoint**  
SPARQL clients can query the data  
<http://linked.rvdata.us/sparql>  
The database can also be explored

Powered by

*List of Datasets (collections of data files from sensor/system X on vessel Y during cruise Z)*

All Fileset | Rolling Deck to Repository (R2R) Linked Data

- [AT15-68 acqsys \(Hawaii UHDAS\)](#)  
<http://linked.rvdata.us/resource/fileset/102209>
- [AT15-69 acqsys \(WHOI Calliope\)](#)  
<http://linked.rvdata.us/resource/fileset/102210>
- [AT16 acqsys \(WHOI Calliope\)](#)  
<http://linked.rvdata.us/resource/fileset/102212>
- [AT16 ctd \(Sea Bird SBF-911plus\)](#)  
<http://linked.rvdata.us/resource/fileset/102213>
- [AT16 multibeam \(SeaBeam 2112\)](#)  
<http://linked.rvdata.us/resource/fileset/102214>

AT16 multibeam (SeaBeam 2112) | Rolling Deck to Repository (R2R) Linked Data

**AT16 multibeam (SeaBeam 2112)**  
Resource URI: <http://linked.rvdata.us/resource/fileset/102214>

Home | [All Fileset](#)

Property	Value
is r2r:Fileset of	< <a href="http://linked.rvdata.us/resource/cruise/AT16">http://linked.rvdata.us/resource/cruise/AT16</a> >
r2r:Format	< <a href="http://linked.rvdata.us/resource/format/100030">http://linked.rvdata.us/resource/format/100030</a> >
dcterms:identifier	102214
rdfs:label	AT16 multibeam (SeaBeam 2112)
dcterms:source	< <a href="http://get.rvdata.us/cruise/AT16/fileset/102214">http://get.rvdata.us/cruise/AT16/fileset/102214</a> >
dcterms:tableOfContents	< <a href="http://www.rvdata.us/list/fileset.php?id=102214">http://www.rvdata.us/list/fileset.php?id=102214</a> >
dcterms:title	AT16 multibeam (SeaBeam 2112)
rdf:type	r2r:Fileset

**Metadata**

< <a href="http://linked.rvdata.us/data/fileset/102214">http://linked.rvdata.us/data/fileset/102214</a> >	
dc:date	2013-04-07T20:40:14.465Z
prv:containedBy	< <a href="http://linked.rvdata.us/dataset">http://linked.rvdata.us/dataset</a> >
void:inDataset	< <a href="http://linked.rvdata.us/dataset">http://linked.rvdata.us/dataset</a> >
rdf:type	prv:DataItem
rdf:type	foaf:Document

*One dataset, with file manifest and download link*

<http://linked.rvdata.us/>

# LOD Partners

- Integrated Ocean Drilling Program (IODP)
- Rolling Deck to Repository (R2R) Program
- Biological & Chemical Oceanography Data Management Office (BCO-DMO)
- British Oceanographic Data Centre (BODC)
- Index to Marine and Lacustrine Geological Samples (IMLGS)★
- InterRidge Hydrothermal Vents Database★

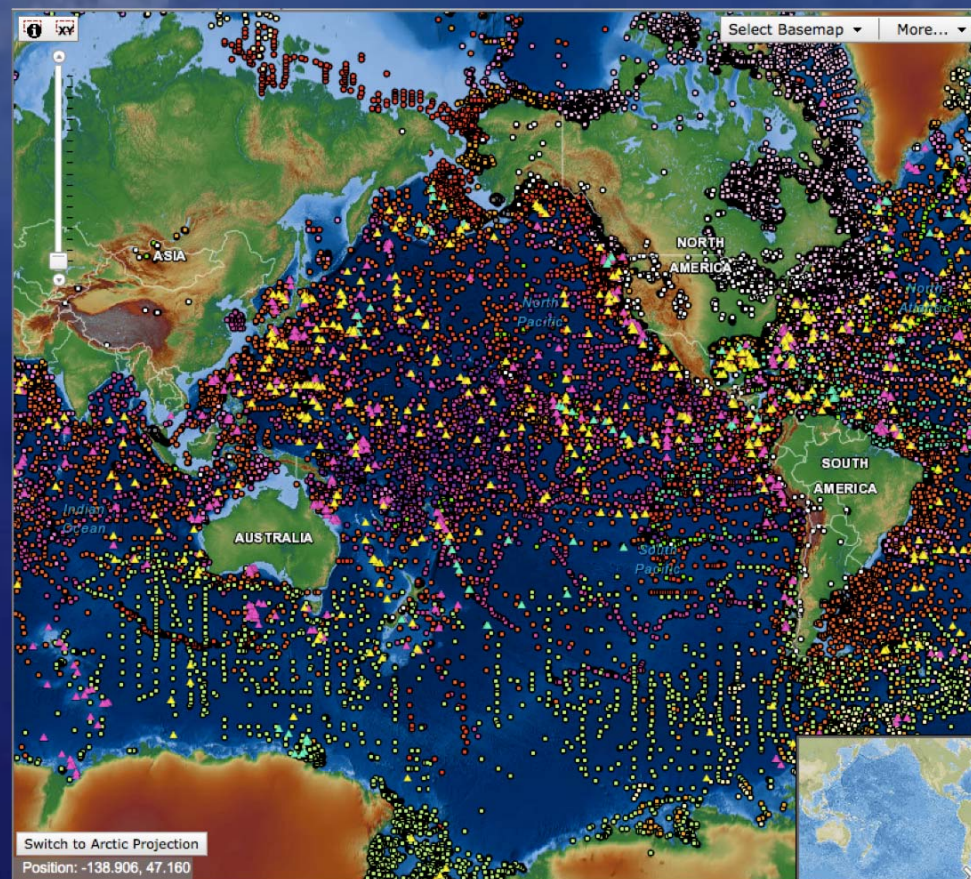
★ New in 2013



# LOD Partners *(cont.)*

## Index to Marine and Lacustrine Geological Samples (IMLGS)

- Global database of rock and sediment cores, dredges, grabs from seafloor/lakebeds
- Links samples to:
  - ICES Platform Codes
  - **R2R Cruise IDs**
  - Intl Geo Sample Numbers (IGSNs)where known





# R2R <> IMLGS

## Cruise at IMLGS

Healy HLY1202 Link(s) | Index to Marine and Lacustrine Geological Samples (IMLGS) Linked Data

linked.seabedsamples.org/page/imlgs/cruise\_links/Healy/HLY1202

Healy HLY1202 Link(s)  
Resource URI: [http://linked.seabedsamples.org/resource/imlgs/cruise\\_links/Healy/HLY1202](http://linked.seabedsamples.org/resource/imlgs/cruise_links/Healy/HLY1202)

[Home](#) | [All leg links](#) | [All cruise links](#)

Property	Value
db:vocab/cruise_datalink	< <a href="http://icefloe.net/healy-current-mission">http://icefloe.net/healy-current-mission</a> >
db:vocab/cruise_datalink	< <a href="http://walrus.wr.usgs.gov/infobank/h/h3812ar/html/h-38-12-ar.meta.html">http://walrus.wr.usgs.gov/infobank/h/h3812ar/html/h-38-12-ar.meta.html</a> >
db:vocab/cruise_datalink	< <a href="http://woodshole.er.usgs.gov/operations/ia/public_ds_info.php?fa=2012-038-FA">http://woodshole.er.usgs.gov/operations/ia/public_ds_info.php?fa=2012-038-FA</a> >
db:vocab/cruise_datalink	< <a href="http://www.ngdc.noaa.gov/mgg/curator/data/healy/hly1202/">http://www.ngdc.noaa.gov/mgg/curator/data/healy/hly1202/</a> >
db:vocab/cruise_datalink	< <a href="http://www.rvdata.us/catalog/HLY1202">http://www.rvdata.us/catalog/HLY1202</a> >
db:vocab/cruise_link_cruise	HLY1202
db:vocab/cruise_link_level	cruise
db:vocab/cruise_link_platform	< <a href="http://linked.seabedsamples.org/resource/imlgs/platform/Healy">http://linked.seabedsamples.org/resource/imlgs/platform/Healy</a> >
db:vocab/cruise_link_source	InfoBank
db:vocab/cruise_link_source	NGDC
db:vocab/cruise_link_source	R2R
db:vocab/cruise_link_source	USCG
db:vocab/cruise_link_source	USGSWH
db:vocab/cruise_link_type	Dredge-related data
db:vocab/cruise_link_type	data
db:vocab/cruise_link_type	information
rdfs:label	Healy HLY1202 Link(s)
rdf:type	vocab:cruise_links
db:vocab/underlying_sample	< <a href="http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/HLY1202/HLY1202-DR1/dredge%2C_rock">http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/HLY1202/HLY1202-DR1/dredge%2C_rock</a> >
db:vocab/underlying_sample	< <a href="http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/HLY1202/HLY1202-DR2/dredge%2C_rock">http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/HLY1202/HLY1202-DR2/dredge%2C_rock</a> >
db:vocab/underlying_sample	< <a href="http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/HLY1202/HLY1202-DR3/dredge%2C_rock">http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/HLY1202/HLY1202-DR3/dredge%2C_rock</a> >
db:vocab/underlying_sample	< <a href="http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/HLY1202/HLY1202-DR4/dredge%2C_rock">http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/HLY1202/HLY1202-DR4/dredge%2C_rock</a> >
db:vocab/underlying_sample	< <a href="http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/HLY1202/HLY1202-DR5/dredge%2C_rock">http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/HLY1202/HLY1202-DR5/dredge%2C_rock</a> >

Cruise Catalog: HLY1202 | Rolling Deck to Repository (R2R)


www.rvdata.us/catalog/HLY1202

Rolling Deck to Repository (R2R)

Home About R2R Cruise Catalog News Contact Us Internal

Home

Cruise Catalog: HLY1202



Operator: United States Coast Guard  
Vessel: Healy

Cruise ID	Start Date	Start Port	End Date	End Port
HLY1202	2012-08-26	Barrow	2012-09-24	Barrow

Details

Project: U.S. Extended Continental Shelf (ECS) Survey (Info)

- SCIENCE PARTY
- FILE MANIFEST
- UNDERWAY DATA SETS
- R2R PRODUCTS
- RELATED DATA

Index to Marine & Lacustrine Geological Samples (Info) Samples

## Cruise at R2R

<http://linked.seabedsamples.org/>





ECS:Healy:HL1202:HL1202-DR1:dredge, rock | Index to Marine and Lacustrine Geological Samples (IMLGS) Linked Data

Resource URI: [http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/HL1202/HL1202-DR1/dredge\\_rock](http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/HL1202/HL1202-DR1/dredge_rock)

[Home](#) | [All samples](#)

Property	Value
db:vocab/collection_date	20120917
db:vocab/collection_date_ending	20120917
db:vocab/collection_device	< <a href="http://linked.seabedsamples.org/resource/imlgs/device/dredge%2C_rock">http://linked.seabedsamples.org/resource/imlgs/device/dredge%2C_rock</a> >
db:vocab/collection_east_or_west	W
db:vocab/collection_ending_east_or_west	W
db:vocab/collection_ending_latitude	80.76477 (xsd:decimal)
db:vocab/collection_ending_latitude_minutes	45.89
db:vocab/collection_ending_latitude_whole_degrees	80 (xsd:decimal)
db:vocab/collection_ending_longitude	-155.88785 (xsd:decimal)
db:vocab/collection_ending_longitude_minutes	53.27
db:vocab/collection_ending_longitude_whole_degrees	155 (xsd:decimal)
db:vocab/collection_ending_north_or_south	N
db:vocab/collection_latitude	80.81377 (xsd:decimal)
db:vocab/collection_latitude_minutes	48.83
db:vocab/collection_latitude_whole_degrees	80 (xsd:decimal)
db:vocab/collection_latitude_original_form	D
db:vocab/collection_longitude	-155.90427 (xsd:decimal)
db:vocab/collection_longitude_minutes	54.26
db:vocab/collection_longitude_whole_degrees	155 (xsd:decimal)
db:vocab/collection_north_or_south	N
db:vocab/collection_water_depth_m	3805 (xsd:decimal)
db:vocab/collection_water_depth_m_end	3678 (xsd:decimal)
db:vocab/cruise	HL1202
db:vocab/data_url	< <a href="http://www.ngdc.noaa.gov/geosamples/showsample.jsp?imlgs=imlgs0201544">http://www.ngdc.noaa.gov/geosamples/showsample.jsp?imlgs=imlgs0201544</a> >
db:vocab/figsn	< <a href="http://app.geosamples.org/sample_display.php?figsn=ECS004000">http://app.geosamples.org/sample_display.php?figsn=ECS004000</a> >
db:vocab/imlgs	< <a href="http://www.ngdc.noaa.gov/geosamples/showsample.jsp?imlgs=imlgs0201544">http://www.ngdc.noaa.gov/geosamples/showsample.jsp?imlgs=imlgs0201544</a> >
rdfs:label	ECS:Healy:HL1202:HL1202-DR1:dredge, rock
is db:vocab/parent of	< <a href="http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/">http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/</a> >
is db:vocab/parent of	< <a href="http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/">http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/</a> >
is db:vocab/parent of	< <a href="http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/">http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/</a> >
is db:vocab/parent of	< <a href="http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/">http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/</a> >
is db:vocab/parent of	< <a href="http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/">http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/</a> >
is db:vocab/parent of	< <a href="http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/">http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/</a> >
is db:vocab/parent of	< <a href="http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/">http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/</a> >
is db:vocab/parent of	< <a href="http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/">http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/</a> >
is db:vocab/parent of	< <a href="http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/">http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/</a> >
is db:vocab/parent of	< <a href="http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/">http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/</a> >
is db:vocab/parent of	< <a href="http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/">http://linked.seabedsamples.org/resource/imlgs/ECS/Healy/</a> >
db:vocab/platform	< <a href="http://linked.seabedsamples.org/resource/imlgs/platform/Healy/">http://linked.seabedsamples.org/resource/imlgs/platform/Healy/</a> >
db:vocab/principal_investigator	Larry Mayer
db:vocab/sample	HL1202-DR1
db:vocab/sample_comments	99 percent mud, several small outcrop rocks (less than 1 per target 3700 m, probably did not hit it, hit 3650 m. Several 500 m piles on tension suggesting ones on outcrop between 3480-3495m water depth under ship; fault block; Arctic Ocean, Amerasia Basin, along edge of Nautilus Basin, av 3800m water depth; Steep slope (greater than 50 degrees) on southern edge of Nautilus Basin around 3750m, greater than 30 degree slope above 3600 to 3550 m.

*Intl Geo Sample  
Number  
(link to registry)*

*Platform  
(link to ICES  
ship code)*

Healy | Index to Marine and Lacustrine Geological Samples (IMLGS) Linked Data

[linked.seabedsamples.org/page/imlgs/platform/Healy](http://linked.seabedsamples.org/page/imlgs/platform/Healy)

db:vocab/platform_date_added	2009-12-29T00:00:00 (xsd:dateTime)
db:vocab/platform_ices_code	< <a href="http://vocab.nerc.ac.uk/collection/C17/current/33HQ">http://vocab.nerc.ac.uk/collection/C17/current/33HQ</a> >
db:vocab/platform_id	317 (xsd:decimal)
db:vocab/platform_name	Healy
db:vocab/platform_prefix	USGCC
db:vocab/platforms_publish	Y
is db:vocab/sample_link_parent_platform of	< <a href="http://linked.seabedsamples.org/resource/imlgs/sample_links/Healy/HL1202/HL1202-DR1/">http://linked.seabedsamples.org/resource/imlgs/sample_links/Healy/HL1202/HL1202-DR1/</a> >
is db:vocab/sample_link_parent_platform of	< <a href="http://linked.seabedsamples.org/resource/imlgs/sample_links/Healy/HL1202/HL1202-DR2/">http://linked.seabedsamples.org/resource/imlgs/sample_links/Healy/HL1202/HL1202-DR2/</a> >
is db:vocab/sample_link_parent_platform of	< <a href="http://linked.seabedsamples.org/resource/imlgs/sample_links/Healy/HL1202/HL1202-DR3/">http://linked.seabedsamples.org/resource/imlgs/sample_links/Healy/HL1202/HL1202-DR3/</a> >
is db:vocab/sample_link_parent_platform of	< <a href="http://linked.seabedsamples.org/resource/imlgs/sample_links/Healy/HL1202/HL1202-DR4/">http://linked.seabedsamples.org/resource/imlgs/sample_links/Healy/HL1202/HL1202-DR4/</a> >
is db:vocab/sample_link_parent_platform of	< <a href="http://linked.seabedsamples.org/resource/imlgs/sample_links/Healy/HL1202/HL1202-DR5/">http://linked.seabedsamples.org/resource/imlgs/sample_links/Healy/HL1202/HL1202-DR5/</a> >
db:type	vocab:platforms



# LOD Vocabularies

<http://vocab.nerc.ac.uk/>

Work ongoing to replace R2R vocabularies with terms from NERC Vocabulary Server (NVS) eg.

- Map vessels to SeaVoX platform categories (L06) and ICES platform codes (C17)
- Map ports to SeaDataNet keyword types (L19) and gazetteer (C38)
- Map devices to SeaDataNet device categories (L05) and BODC device catalog (L22)

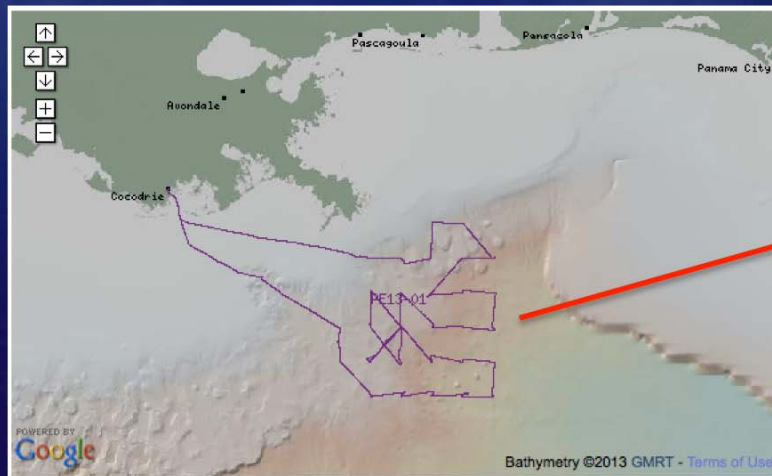
Future work: parameters (P02), units (P06), activities (C77)



# LOD Geometries

Hybrid approach to publish geospatial information:

- Encode spatial extent of Cruise track (bounding box) using *wgs84\_pos:long* and *wgs84\_pos:lat*
- Encode control points for Cruise track (linestring) using *geo:asWKT* from GeoSPARQL vocabulary



**Example: R/V Pelican  
cruise PE13-01 track**

PE13-01 Track | Rolling Deck to Repository (R2R) Linked Data

**PE13-01 Track**  
Resource URI: <http://linked.rvdata.us/resource/track/PE13-01>

[Home](#) | [All Track](#)

Property	Value
is r2r:Track of	<a href="http://linked.rvdata.us/resource/cruise/PE13-01">http://linked.rvdata.us/resource/cruise/PE13-01</a>
geo:asWKT	LINESTRING(-90.6634521652 29.252713223,-90.674510659 29.2394028263,-90.6123059827 29.1878232937,-90.59 29.1408480212,-90.5671600132 29.0337090942,-90.507130543 29.0079320405,-89.9735411083 28.9153085867,-89.9583854362 28.9020853392,-89.4512859912 28.8379567425,-89.1819959462 28.7859802993,-89.1054684927 28.7572225193,-89.0898195343 28.7681324233,-88.9994826697 28.7492668332,-88.7352979295 28.7502755765,-88.7472996128 28.7481559295,-88.7220434695 28.7116648733,-88.499622375 28.7506413018,-88.5011646092 28.7400899727,-88.496879734 29.0130508788,-88.2499554198 28.999651444,-88.2462047272 29.0117257703,-88.0008141995 28.7509507998,-87.9827206607 28.756293588,-88.2516058462 28.7502572437,-88.2568446022 28.7233769188,-88.2506221158 28.7501349765,-88.5390436907 28.4628123937,-88.4991226077 28.5015311433,-88.502106992 28.4832333658,-88.5267407275 28.4843938923,-88.2493520952 28.5000570412,-88.2375444943 28.5205544702,-87.9712340093 28.4992940288,-87.9999450118 28.2511656177,-87.97 28.2305435643,-88.2499007205 28.2497487852,-88.2259124222 28.2578265457,-88.500149494 28.2500736263,-88.4796310577 28.2683688355,-88.7637886478 28.5077343392,-88.7486737114 28.1236314045,-88.7719476252 28.0262027225,-88.7451127618 27.9956479655,-88.753445339 27.9820524608,-88.9994981445 28.2493505388,-88.9988364128 28.5361633638,-89.0018017725 28.4983234142,-88.9982598437 28.5154015215,-88.7490489498 28.2491212135,-88.7607022342 28.2200443346,-88.7484079723 28.2525625078,-88.8787549395 28.1448517057,-88.9438841203 28.0549131418,-89.0331440125 28.0182501128,-88.9988728573 27.9974896242,-89.0186844257 28.0077350248,-88.9982246652 28.0123224608,-88.7528831105 28.2471533532,-88.7524875207 28.2653611645,-88.4995473173 27.999822874,-88.5012518903 28.046640127,-88.248655788 27.9998667453,-88.234051643 28.0221502405,-87.9810308697 28.0021488808,-87.9998328548 27.77509447802,-87.9719458017 27.7482053988,-88.2497667107 27.7501782733,-88.221431331 27.7768718757,-88.1836180617 27.7671231742,-88.5013054478 27.7496926682,-88.4775041803 27.7884226585,-88.7495688537 27.749434987,-88.7096369497 27.7983162705,-88.7494567447 27.7501187352,-88.7214610377 27.7797918628,-89.000793927 27.7501681792,-89.0105024022 27.7806505222,-89.2530123078 27.9931207037,-89.270572781 28.148812877,-89.250208042 28.2500330983,-89.7496309957 28.4999475205,-89.8996246548 28.5998723748,-89.8960813253 28.6128397078,-90.1001862635 28.650104221,-90.5002454085 28.849974218,-90.6079525012 29.1814178965,-90.675524949 29.246312231) (geo:WktLiteral)
rdfs:label	PE13-01 Track
rdf:type	sf:LineString

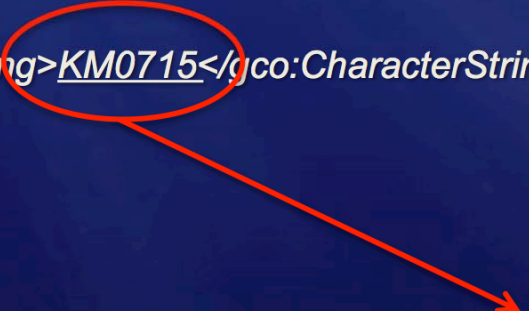


# ISO Metadata

- R2R publishes *fieldSession* (Cruise) level records; eventually *series* (Dataset) and *dataset* (File/Sample) as well
- Embed shiptrack geometry as GML object in Cruise record
- Replace *gco:CharacterString* (text) with *gmx:Anchor* (LOD URI) for controlled vocabulary terms where possible eg.

```
<gmd:MD_Identifier>
  <gmd:code>
    <gco:CharacterString>KM0715</gco:CharacterString>
  </gmd:code>
</gmd:MD_Identifier>

<gmd:MD_Identifier>
  <gmd:code>
    <gmx:Anchor xlink:href="http://linked.rvdata.us/resource/cruise/KM0715"
      xlink:actuate="onRequest">KM0715</gmx:Anchor>
  </gmd:code>
</gmd:MD_Identifier>
```



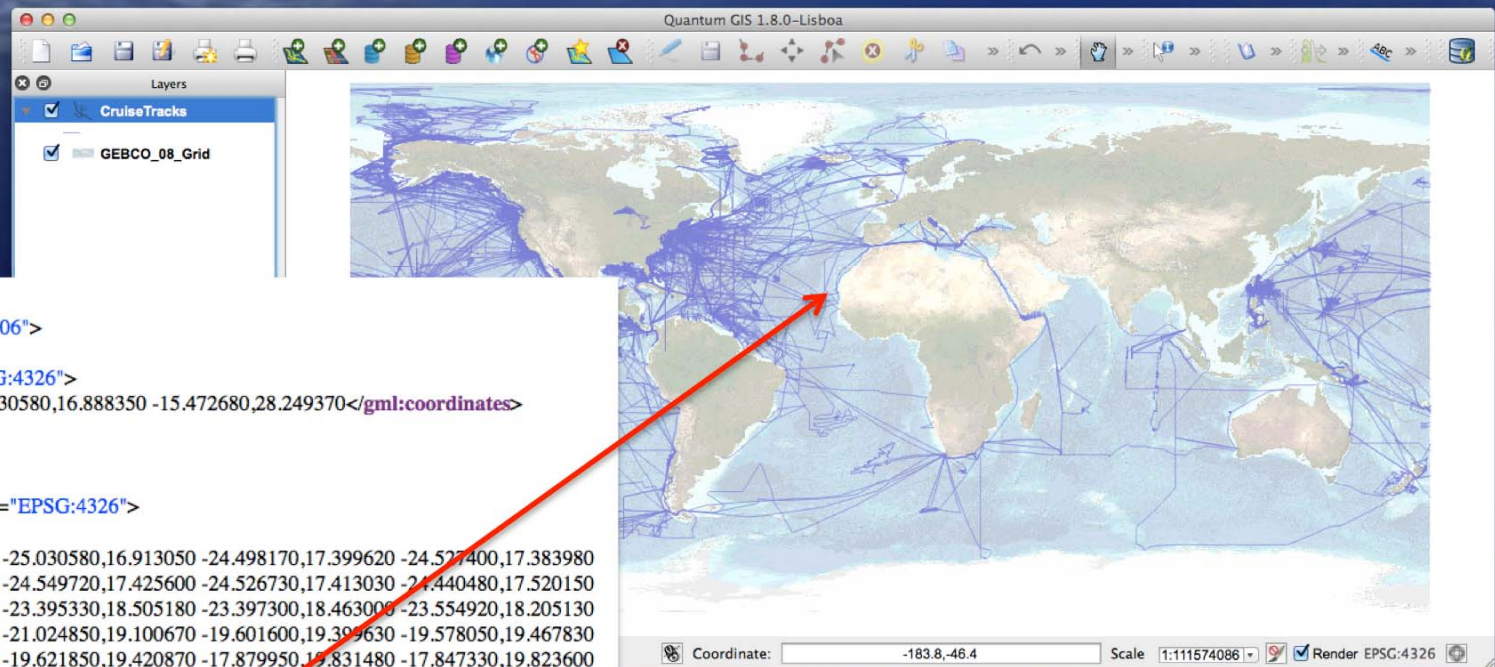


LOD application:

# OGC Services

Publish Cruise track control points as Web Feature Service (WFS)  
with embedded LOD URIs

<http://get.rvdata.us/wfs?service=wfs&version=1.0.0&request=getcapabilities>



```
- <gml:featureMember>
- <ms:CruiseTracks fid="41770506">
- <gml:boundedBy>
- <gml:Box srsName="EPSG:4326">
- <gml:coordinates>-25.030580,16.888350 -15.472680,28.249370</gml:coordinates>
- </gml:Box>
- </gml:boundedBy>
- <ms:msGeometry>
- <gml:LineString srsName="EPSG:4326">
- <gml:coordinates>
-25.005000,16.888350 -25.030580,16.913050 -24.498170,17.399620 -24.527400,17.383980
-24.500900,17.400530 -24.549720,17.425600 -24.526730,17.413030 -24.440480,17.520150
-23.912350,17.992720 -23.395330,18.505180 -23.397300,18.463000 -23.554920,18.205130
-21.484170,19.018730 -21.024850,19.100670 -19.601600,19.309630 -19.578050,19.467830
-19.596120,19.386820 -19.621850,19.420870 -17.879950,19.831480 -17.847330,19.823600
-17.701220,19.888130 -17.449880,19.933680 -17.508020,19.918370 -17.544950,19.945230
-15.586400,28.249370 -15.472680,28.249120
- </gml:coordinates>
- </gml:LineString>
- </ms:msGeometry>
- <ms:CruiseID>OC449-03</ms:CruiseID>
- <ms:CruiseURI>http://linked.rvdata.us/resource/cruise/OC449-03</ms:CruiseURI>
- </ms:CruiseTracks>
- </gml:featureMember>
```

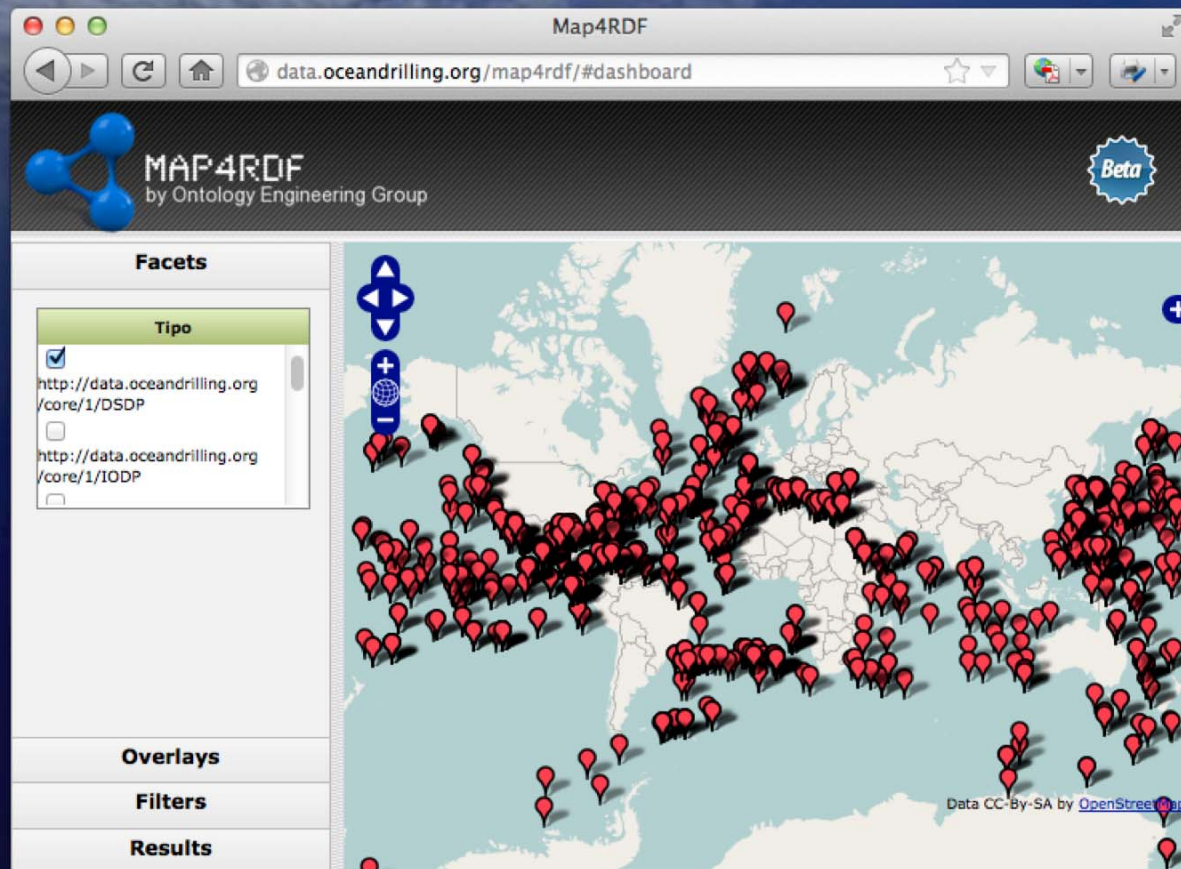
Cruise OC449-03  
trackline  
geometry

R2R Catalog  
displayed in  
QGIS desktop  
client



# Next Steps

- Deploy Web map-based browser over LOD content/partners



<http://data.oceandrilling.org/map4rdf/>



(cont.)

# Next Steps

- Implement new W3C Data Set Catalog (DCAT) vocabulary  
eg.  
*dcat:Catalog* , *dcat:Dataset* , *dcat:Distribution*
- Extend /improve query capabilities
  - Upgrade to new GeoSPARQL standard (“get tracks/ samples within radius X of point Y”)
  - Deploy OpenSearch - publish a set of standard queries +responses
- Participate in Ocean Data Interoperability Platform (ODIP) int’l workshops and prototypes





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